



Newsletter of the Australian Society for History of Engineering and Technology

Update on the future of the Powerhouse Museum

ASHET News for October 2016 contained an article on the Powerhouse Museum that included a section on the proposal to move the museum to Parramatta and sell the land at Ultimo on which it is currently located. It is available as a pdf that can be read on line or downloaded at <http://ashet.org.au/newsletter/>. Since then little has changed.

So far as we know, the Board of Trustees of the Museum of Arts and Sciences (MAAS) is still planning to submit its report on the business case for moving the museum to Cabinet shortly. MAAS has recently advertised a new temporary part time position of New Museum Project Coordinator to collaborate across a wide range of stakeholders. Applications close on 16 January 2017, details at <https://maas.museum/careers/career-opportunities/>.

The Legislative Council Inquiry into museums and galleries appointed in 2016 is considering in particular the plan to move the Powerhouse Museum to Parramatta, and is now expected to submit its report in April 2017. Details of the Inquiry including transcripts and copies of submissions are available online at <https://www.parliament.nsw.gov.au/committees/inquiries/Pages/inquiry-details.aspx?pk=2403>.

New books on the history of technology

Two new books that may be of interest to ASHET members have been published recently.

The Iron Man of Sydney Cove: The Untold Story of Richard Dawson, Colonial Engineer, (270pp +36 colour images) by Harry Irwin, was published last month by Australian Scholarly Publishing in Melbourne. Harry, an Emeritus Professor of history at Western Sydney University, spoke on this topic at the ASHET meeting on 30 October 2014 and has since done further research on Richard Dawson and his foundry.

Damien Finlayson, an amateur military historian, has written a book on the little known 'Alphabet Company' in the Great War. With less than 300 members the Compny's influence was great. Under Major Vicor Morse DSO it operated and maintained equipment such as pumps, generators, ventilation fans, drilling equipment and other specialised devices on the Western Front. The book *The Lightning Keepers*, is published by Big Sky Publishing of Melbourne. If anyone is interested in written a review of the book, contact Sharon Evans at Big Sky Publishing on sharon@bigskypublishing.com.au.

Conference Aviation Cultures Mk III at Sydney University 27-28 April

Registration for the conference, of which ASHET member Peter Hobbins is a Convenor, are now open and may be made at: <https://www.eventbrite.com.au/e/aviation-cultures-mk-iii-airspaces-mobilities-identities-tickets-32789273600?aff=homecard>.

There is no registration fee and daytime meals are provided courtesy of the sponsors.

ASHET Annual General Meeting, Thursday 27 April

The 2017 ASHET Annual General Meeting will be held at History House, 133 Macquarie Street, Sydney, on Thursday 27 April 2017 at 6.00pm. Light refreshments will be served before the meeting at 5.30pm.

The meeting is expected to be brief and will be followed immediately by a joint meeting of ASHET and the Royal Australian Historical Society with a talk by landscape architect Stuart Read about the landscape heritage of Yaralla Estate at Concord.

Each member is entitled to appoint another member as proxy by notice given to ASHET's Public Officer (The Secretary) no later than 24 hours before the time of the meeting. ASHET's constitution requires that no member may hold more than five proxies.

The agenda of the Annual General Meeting will be

1. Receive apologies
2. Confirm the minutes of the Annual General Meeting 2016
3. Receive committee report on activities for the year 2016
4. Receive and consider financial statement for the year 2016
5. Election of Office Bearers and Committee Members for 2017-18

In accordance with ASHET's Constitution, no other business may be conducted at the Annual General Meeting.

Election of ASHET Office Bearers and Committee Members for 2017-18

During the ASHET Annual General Meeting on Thursday 27 April all the present office bearers and committee members will retire, following which nominations will be sought for the following year.

Nominations for the following positions will be called for:

- President
- Senior Vice-President
- Vice-President
- Secretary
- Treasurer
- Three ordinary Committee Members

Nominations must be in writing, signed by two members of ASHET and accompanied by the written consent of the candidate. They must reach the current Secretary not less than seven days before the date of the meeting either by email to secretary.aset@gmail.com or by mail at 2 Malacoota Road, Northbridge NSW 2063.

Update on ASHET Pies project

ASHET's graphic displays *The meat pie: Australia's own fast food* have now completed their tour of NSW public libraries, visiting over forty libraries for a period of approximately one month at each library. The tour of the two sets of ten display panels was coordinated by ASHET committee member Liz Roberts.

One set of display panels is now on a tour of South Australian libraries organised by the South Australian State Library. We are currently discussing the loan of a set of display panels for a tour of Tasmanian libraries with the Tasmanian State Library.

Position of Editor ASHET News

Last year I retired because of pressure of other commitments from the position of editor and producer of *ASHET News*, a position I had held from its commencement in 2008. The committee looked for a new editor, without success, with the result that no July issue was published last year. As ASHET needs a regular newsletter I agreed to continue as editor and producer for the time being while the committee searched for a new appointee.

If you are interested in filling this position, or know someone who might be interested, please contact any of the committee members.

Ian Arthur

Next ASHET events

ASHET visit to Ryde Pumping Station on 12 May

ASHET members and friends are invited to join in a guided tour of the Ryde Water Pumping Station at West Ryde on Friday 12 May 2017. The tour will start at 2:00pm and conclude at about 3:30pm. Prior to this tour, you are invited to join us at 12:00 noon for lunch at the Palm Court Bistro in the Ryde-Eastwood Leagues Club.

Guided tour of the site

The guided tour will include the railway siding where coal was delivered to the Station, the coal bins, the massive boiler hall, and the Sydney Water photo archives housed here. Extensive restoration work has been carried out to preserve the historically important features of the structures on the site.

This tour is one of several public tours organised by Sydney Water to occur during Sydney Heritage Festival, and it will be adapted to meet the interests of ASHET members.

Significance

An extract from the statement of significance for this site reads: "Ryde Water Pumping Station and site is of high cultural significance to the State of NSW for the important role it serves in the history of water supply in Sydney. [It] ... is a late and representative example of a Federation free style utility building. [It] ... is representative of large steam powered water pumping stations used in the late 19th and early 20th century. The item features evidence of numerous past and present technological processes"

Directions for train travellers

From the platforms at West Ryde Train Station, use the pedestrian bridge to walk East to Ryedale Road. Cross over Ryedale Road, walk about 50m North to the junction with Wattle Street, then enter the Ryde-Eastwood Leagues Club. Sign in and go to the Palm Court Bistro.

After lunch, we will leave at 1:30pm to walk South along Ryedale Road to its merger with Victoria Road, then cross over at Hermitage Road to the Pumping Station entrance.

Directions for drivers

Turn South off Victoria Road into Hermitage Road (beside the Pumping Station) where parking is usually available. Walk across Victoria Road at Hermitage Road, then West along Victoria Road and into Ryedale Road which leads you to the Ryde-Eastwood Leagues Club.

Bookings

This group size for this tour is limited to 25, so please book early. Send a text message to Rob at 0418 409 743 to book places in the ASHET group. There is no charge for the tour. Also, please indicate whether you will be joining us for lunch at the Palm Court Bistro (at your own expense).

Safety

To ensure your safety during the tour, please wear enclosed shoes. The Sydney Water guides will issue safety helmets at the beginning of the tour.

Thursday 27 April 2017

Talk by Stuart Read

Yaralla, Concord - its landscape heritage

Hidden in inner-west Sydney, on the Parramatta River are 2 peninsulae marking the domain of the Walker family: merchant Thomas and only child, Eadith. Both were willed to NSW's people as convalescent hospitals. Yaralla (Dame Eadith Walker Convalescent Hospital)'s expansive grounds are a little-known surprise. Paddocks in Concord (much of it a Walker gift), this 19th c. estate retains many components and quirks: Australia's largest private grotto and earliest private pool. Learn more.

Stuart Read was fortunate to win an overseas fellowship from the Pratt Foundation/ International Specialised Skills Institute, travelling through Spain in 2005 studying the management of change in old and new parks and gardens. He led a tour of Spanish gardens for the Friends of the Historic Houses Trust of NSW, in 2010. Trained in science, amenity horticulture and landscape architecture in New Zealand, he has specialised since 1991 in working on Australian World, National and now NSW heritage areas. Stuart strives for acceptance of landscapes as a valid type of heritage place worth managing sensitively. Particular passions are lessons from historic gardens, tracing global plant movement, better management of cultural landscapes as part of our future identity and economy.

Venue: History House, 133 Macquarie Street, Sydney

Time: 5.30 for 6 pm

Cost; Includes light refreshments on arrival; RAHS and ASHET members \$10, others \$12

Bookings: phone RAHS on (02) 9247 8001 or email history@rahs.org.au



More ASHET events

There will be ASHET-RAHS meetings at History House in May and June 2017, with the details yet to be confirmed. Details will be posted on the ASHET website <http://ashet.org.au/>, and details will be emailed to ASHET members when they become available.

History in the making: electric cars

by Ian Arthur

For over a century, fossil fuels (petrol, diesel and natural gas) have been the main source of energy for road vehicles throughout the world. In 1990 there were no electric cars in mass production. Today one car in a hundred sold is powered by electricity; the proportion of electric vehicles on the road is well below 1%. But that situation appears about to change. Most forecasters have been predicting that the proportion of electric vehicles will be around 4% by 2025. But there are now increasing expectations that the number of electric vehicles will grow even faster than this. Car manufacturers are investing heavily in new models of battery vehicles and hybrid vehicles (ones that have both internal combustion engines and electric drive motors). Ford announced in 2016 that it would launch 30 new battery powered models by 2025, by which time it expected electric vehicles would account for 25% of its sales. All major car-makers now have electric vehicles or hybrids as an important part of their range.

This might seem like history repeating itself. In 1900, electric cars outnumbered petrol driven cars by a wide margin. But that was for reasons entirely different from the ones driving the move towards electric cars today.

History of electric vehicles

The 1830s saw the first electric motors, powered by non-rechargeable batteries, and these were applied to drive various items of machinery, including vehicles, but they were not commercially successful. The first known electric car was built in 1837 by chemist Robert Davidson of Aberdeen.

An important step forward was the invention of the rechargeable lead-acid battery in 1859 by French physicist Gaston Planté. Improved versions were being manufactured on an industrial scale by the early 1880s. By this time, electric motors had been greatly improved, and electric generators were providing mains power. Thomas Parker, an English inventor, who was also responsible for electrifying the London underground, built the first production electric car in 1884, using his own design of high power rechargeable batteries.

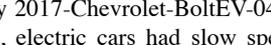
In America, the first electric car was built by William Morrison of Des Moines in 1891. It was a six passenger wagon, capable of moving at 20km/hour. Fleets of electric powered taxis were established in London and New York during the 1890s.



1895 electric car by Thomas Parker

The twentieth century

By the end of the nineteenth century 33,842 electric cars were registered in America. Electric vehicles made up 38% of the total number of road vehicles, with steam power accounting for 40% and internal combustion engines for 20%. But by 1914 the number of internal combustion

engine road vehicles had reached 1.6 million and electric vehicles were in decline. The period since the turn of the century had seen great improvements in the design and construction of petrol vehicles, along with lower prices, an outcome of mass production led by Henry Ford. One of the important innovations was electric starting powered by a lead-acid on board batteries.  Compared with petrol driven vehicles, electric cars had slow speeds and limited travel between recharges, at that time averaging around 60 km. Efforts by electric power generating companies to promote the use of electric vehicles by providing recharging stations and cars for hire had little success. A petrol-electric hybrid vehicle was introduced to the American market in 1911, with a view to increasing the range between recharges, but it was not a commercial success.

By 1920 petrol-driven vehicles had a commanding share of the market. Their reliability and convenience had steadily improved, with electric starting making and the fitting of mufflers making important contributions; fuel was becoming cheaper. By the middle of the century the majority of the world's electric vehicles were British milk floats, a niche market.



Electric milk float in Liverpool, England, 2005

Signs of change

By the last years of the twentieth century there were growing concerns about the effects of motor vehicles on the environment. In 1990 the Los Angeles area, with a population of over 10 million, was suffering from several days a year on which air pollution, mainly caused by vehicle emissions, was seriously hazardous to health. In January 1990 General Motors presented 'Impact', a concept battery-powered car, at the Los Angeles Auto Show. In September that year, the California Air Resources Board Mandate (CARB), required the seven major American car suppliers to offer zero emission vehicles as a condition of their being allowed to supply petrol vehicles in California from 1998.

GM responded to the Mandate by developing the EV1 and offering it on lease (but not for sale) in parts of California and Arizona from 1996. The EV1, produced from 1996 to 1999 was the world's first mass-produced electric vehicle from a major car manufacturer. It had a lead-acid battery and a stated range of 110 km. Other manufacturers followed in producing electric vehicles for the California market. In its first year, GM leased only 288 cars. In 1999 GM released a second generation electric vehicle that had lower production costs, lower weight and quieter operation. It offered a NiMH battery pack as an alternative to the lead acid one fitted to the original EV1, and this increased the maximum travel between recharges to around 140km.

From the beginning GM expressed its opposition to the 1990 Mandate, and conducted a campaign, including legal action, eventually successful, to have it withdrawn. The oil companies also ran and

encouraged campaigns of opposition to the Mandate and to electric cars generally. GM ceased production of the CV1 shortly after release of the second generation, having produced a total of 1,117 CV1s. In 2002 GM announced that it was removing the leased vehicles from the road. GM formally cancelled the electric car program in 2003. It reclaimed the cars as the leases expired, and eventually converted most of them to scrap.

In 2006 a documentary film, 'Who Killed the Electric Car' was produced and premiered at the Sundance Film Festival that year. The film is now available for no charge to private viewers on the internet. A sequel, 'Revenge of the Electric Car', with the same Director, Chris Payne, was launched in 2011, and is also available on the internet.

A new car manufacturer, Tesla

Just as GM was cancelling its electric car program in 2003, a new company, Tesla, was established in Palo Alto, California, with entrepreneur Elon Musk providing the major part of the startup capital. Tesla's primary goal was to commercialise electric vehicles, starting with a premium sports car and moving to mainstream vehicles. Tesla signed a contract in 2005 with British Group Lotus to produce 'gliders', (complete cars minus the power train) that was extended to supplying a total of at least 2,400 units by the end of 2011. The car, named the Roadster, was a two seat plug-in electric car with lithium ion batteries, and an EPA range of 393 km on a single charge. (EPA is the United States Environmental Protection Agency which among other functions provides certification of the range between charges of electric vehicles). Production and sales began in 2008. In 2010 Tesla began producing right hand drive models for sale in various countries including Australia. The largest market was the US, where it sold at a base price of US\$109,000 and made around 1,800 sales up to 2012 when production ceased.

Tesla announced its Model S in June 2008, and deliveries began in the US in 2012. The Model S is a full size luxury sedan seating five. US sales are estimated at 92,000 up to the end of 2016. Like the Roadster, Model S uses lithium ion batteries. Tesla produces Model S at a factory at Fremont California and assembles the cars for the European market in Tilburg in the Netherlands.

Tesla's next model was Model X, a full size SUV, with deliveries starting in September 2015. The main market is the US, with 18,240 units sold up to the end of 2016, at prices in the range \$US132,000 to \$US144,000.

In March 2016 Tesla unveiled its Model 3, an all-electric car with an



Elon Musk

EPA range of 345 km. Deliveries are expected to start in the second half of 2017. Tesla announced that the starting price in the US, exclusive of any applicable government incentives of US\$35,000. It will be marketed world-wide, including to countries such as Australia that have right hand drive.

Following Tesla's entry into the electric car market, and the advances in the technology of lithium-ion batteries demonstrated in its two seat sports car, GM's Vice-President Bob Lutz persuaded a reluctant GM Board to develop a four or five seat plug-in hybrid electric car for the family market. It would have a 16 kWh battery, providing a 56 km

EPA range, along with a small petrol engine capable of recharging the battery and extending the car's range to between 400 and 480 km. The production model of the car, named the Volt, was unveiled in September 2008. Deliveries to retail customers commenced in December 2010, and the European version, the Opel Ampera, was released in January 2012. A right-hand drive version, the Holden Volt, was released in Australia in December 2012.

GM began retail sales of an all-electric subcompact five-door hatch-



Chevrolet Volt

back car, the Chevrolet Bolt, in November 2016. It has a 150 kW electric motor and a 60kWh lithium ion battery providing a 383 km EPA range with plug-in charging. Its basic retail price in the US is under \$50,000.

Nissan Motors, based in Japan, has developed several concept and



Chevrolet Bolt

limited production electric cars through the Renault-Nissan Alliance. It launched the series production Nissan Leaf all-electric car in December 2010. Five years later the Leaf had become the world's leading electric



Nissan Leaf

vehicle with total sales of over 200,000 units. Its largest market is the US. It is marketed world wide, including Australia, where a total of around 1,000 had been sold by the end of 2016. The current model Leaf is a five-door hatchback with an 80 kW motor and a 30 kWh lithium-ion battery, an EPA range of 172 km and plug-in charging.

The market for electric cars

Currently one car in 100 sold world wide is principally powered by electricity. But in Norway, plug-in battery powered and hybrid electric cars accounted for 29% of new car sales in 2016, and 37.5% for the month of January 2017. Norway's Minister for Transport is predicting that 2025 will see the end of new cars powered by fossil fuels in Norway. Norway's government is encouraging sales of electric vehicles with incentives. All-electric cars and vans are exempt from all non-recurring fees including purchase taxes and 25 % VAT on purchases, making the purchase price of electric cars competitive with conventional cars. Since 98% of electricity in Norway is generated from hydro, and the country is a net exporter of electricity, cars in Norway will become a steadily decreasing contributor to emissions of greenhouse gases.

The situation in Australia is very different. In 2016, 282 electric cars were sold in Australia, fewer than in 2015. A total of 3,487 new electric cars was sold in Australia between 2010 and 2016. Largest seller was a sports and utility vehicle, the plug-in hybrid Mitsubishi Outlander, with a total of 2,015 sales over the seven year period. A distant second was the Nissan Leaf with 528 sales. GM has announced that even though the Bolt had been largely designed at the Holden Design Studio in Melbourne there would not be a right hand drive version for sale in Australia. The second generation of the Volt will not be produced in a right hand drive version. GM's official view is that Australia is not ready for electric vehicles.



Mitsubishi Outlander PHEV hybrid

Global outlook for electric vehicles

China now has the world's largest stock of electric passenger cars with cumulative sales of 645,000 at the end of 2016, with the US in second place with 570,000. Europe accounted for 31.5% of cumulative global sales with 637,000 passenger cars.

Electric vehicles look to have a bright future. It will be an outcome of several factors, principally:

the increasing concern about global warming, and the potential for mitigating it by reducing consumption of fossil fuels:

the technical developments in renewable energy, particularly solar and wind power, and the resulting reductions in the cost of producing clean electrical energy for fuelling electric cars :

the problems caused by air pollution that results from burning fossil fuels, particularly diesel fuel, and to which vehicles are a major contributor:

developments in battery technology which are greatly improving their performance and reducing the cost and increasing the range of electric vehicles:

the continuing increase in the number of cars and their concentration in large cities where electric vehicles can be used to greatest advantage.

Sources and further reading

The two movies mentioned in the text, 'Who Killed the Electric Car' and 'Revenge of the Electric Car', can be downloaded at no cost from the internet at many addresses including <https://www.youtube.com/watch?v=nsJAlrYjGz8> and <https://www.youtube.com/watch?v=jkRlu5a6Sb0> respectively.

There are few books presenting a history of electric vehicles and they become quickly out of date. Wikipedia has on line a large number of entries, some up to date, some not, covering the whole field of electric vehicles. They include comprehensive lists of references, most with direct on line links. Using Wikipedia is the best and quickest way to access information on electric cars.

Electric buses in Sydney

On 31 August 2016 The Electric Blu bus entered service at Sydney Airport. The bus is a Toro model electric bus developed in a joint venture between the Australian operator Carbridge, which provides bus services at several major airports in Australia, and BYD, the world's largest supplier of plug-in electric vehicles, based in Xi'an, Shaanxi Province, China. By the end of 2016 six electric buses had been delivered and Carbridge has placed an order for 40 more. The buses will replace the existing diesel bus fleet that services the 7 km shuttle service between the T2 /T3 terminal area and the Blu Emu Car Park.

The aluminium Gemilang buses, made in China, each have a carrying capacity of 70 passengers. The energy storage is by a 324 kWh iron phosphate battery pack split between the forward roof and the rear engine compartment. provided by BYD. The bus has a 500 km range. The buses are charged overnight at charging stations connected to the grid. There are plans to use solar power for recharging.



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